

STS-107 Mission Images



The launch of the Shuttle Columbia signals the beginning of the STS-107 mission.



Another view of the launch of the Shuttle Columbia.



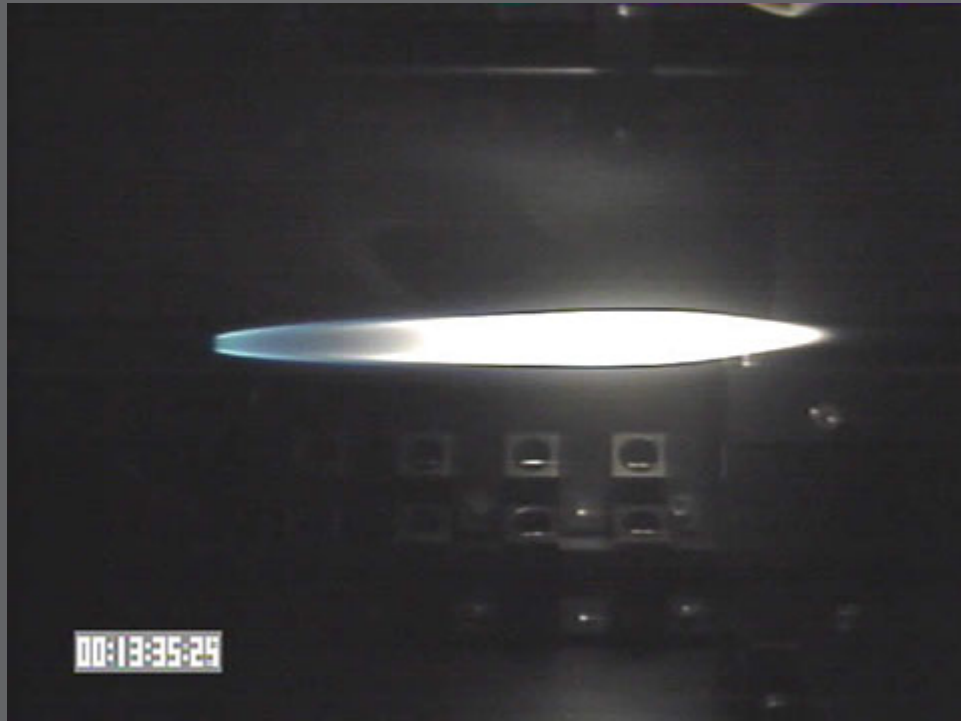
A dramatic photo taken during STS-107 of the SPACEHAB module in the Columbia cargo bay.



The moon over the Earth's horizon as seen from Columbia during STS-107.



The Laminar Soot Processes-2 (LSP-2) team at the Payload Control Center.



During this "burn," LSP-2 scientists were trying to produce the longest possible flame without a "blow-off" (the flame detaching from the nozzle) or the start of soot emission.

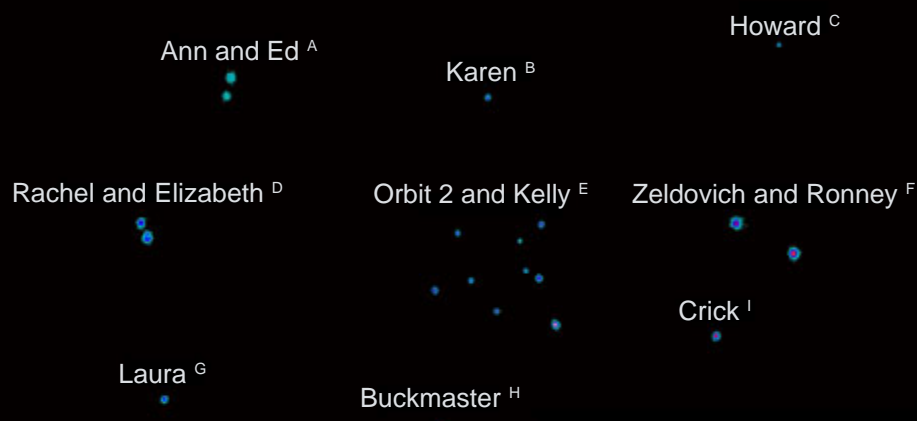


Crew member Michael Anderson installing the LSP-2 Experiment Mounting Structure into the CM-2 combustion chamber during STS-107.



The Structure of Flame Balls at Low Lewis-number-2 (SOFBALL-2) team photographed in the Payload Control Center at Johnson Space Center in Houston, Texas. Dr. Paul Ronney, the Principal Investigator, is holding the SOFBALL sign.

SOFBALL-2 Flame Balls



Gas Mixtures and Atmospheric Pressures (1 atm = 14.69 psi)

- A: 8.0% H_2 - 16.05% O_2 - 7.6% CO_2 - 68.4% He at 3 atm
- B: 10.2% CH_4 - 20.4% O_2 - 69.4% SF_6 at 1 atm
- C: 7.5% H_2 - 15% O_2 - 77.5% SF_6 at 3 atm
- D: 3.32% H_2 - 20.3% O_2 - 76.37% N_2 at 0.7 atm
- E: 7.5% H_2 - 15% O_2 - 77.5% SF_6 at 3 atm
- F: 7.75% H_2 - 15.5% O_2 - 7.6% CO_2 - 69.08% He at 3 atm
- G: 3.32% H_2 - 20.3% O_2 - 76.37% N_2 at 1.75 atm
- H: 6.2% H_2 - 12.4% O_2 - 81.4% SF_6 at 1 atm
- I: 9.9% CH_4 - 19.8% O_2 - 70.3% SF_6 at 1 atm

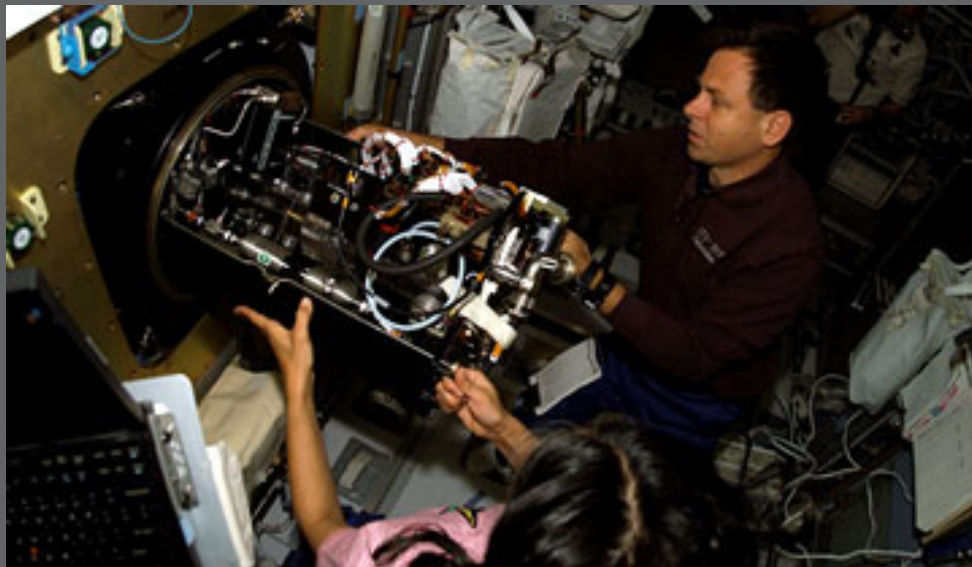
A collage of SOFBALL-2 flame balls, including their names, gas mixtures, and the atmospheric pressures under which they existed. (On Earth, 1 atmosphere is the amount of pressure exerted by the atmosphere at sea level.)



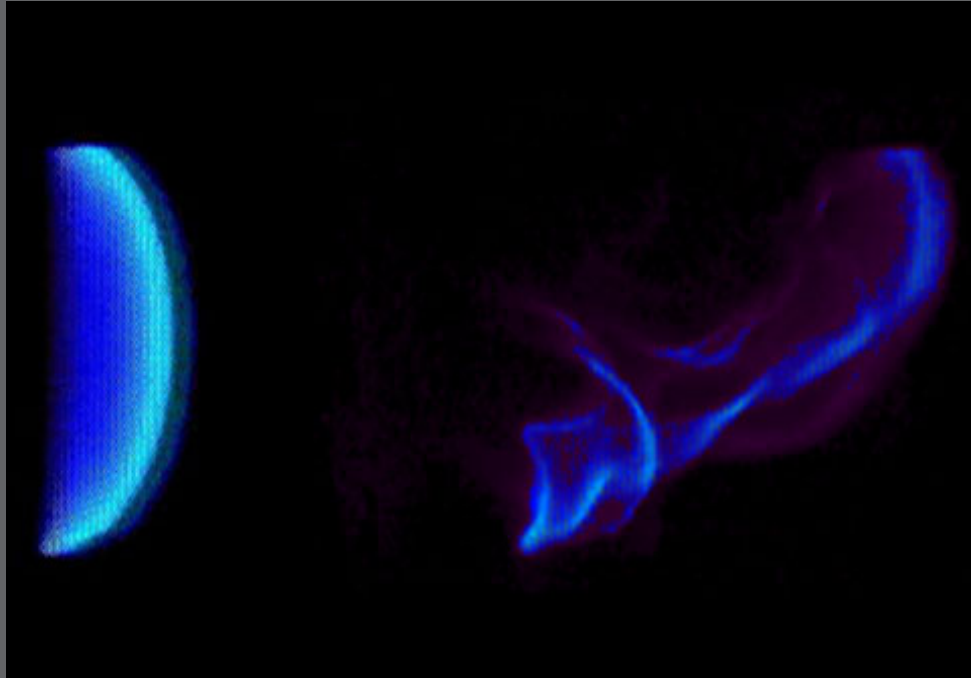
The Mist Payload Control Center team posing behind Suleyman Gokoglu, the Mist project scientist, who holds an enlarged copy of the Mist experiment patch.



While unpacking the Mist Experiment Mounting Structure, crew members Kalpana Chawla and Ilan Ramon pause to watch it float in the Shuttle.



Kalpana Chawla and Ilan Ramon installing the Mist Experiment Mounting Structure into the Combustion Chamber of the CM-2.



A collage showing the Mist flame in the dry section of the flame tube (left) and breaking up in the misted section of the tube. The image has been color-enhanced to reveal flame detail.



Crew members (clockwise from bottom left) Michael Anderson, Kalpana Chawla, Ilan Ramon and Dave Brown posing in front of the Mist EMS, which is installed in the CM-2 Combustion Chamber.



The Combustion Module-2 work area at the Payload Control Center during STS-107.



The CM-2 ground team at work during the midnight shift. Sitting (from front to back) are Lisa VanDerAar, Laura Maynard-Nelson, Dave VanZandt and Ann Over; standing (from left to right) are Dave Simon, Cathy Lewis and Debbie Barnett.



NASA engineers - from the left, Hector Dominguez, Ed Jeris and Cathy Lewis, with Ken Kusanke in the rear - working the second shift at the Payload Control Center during the flight of STS-107.



Crew member Michael Anderson working in the SPACEHAB Module (as seen through the transfer tunnel located between the Module and the crew compartment).



Crew member Kalpana Chawla using a hand-held microphone to communicate with the ground team at the Payload Control Center while monitoring the CM-2.



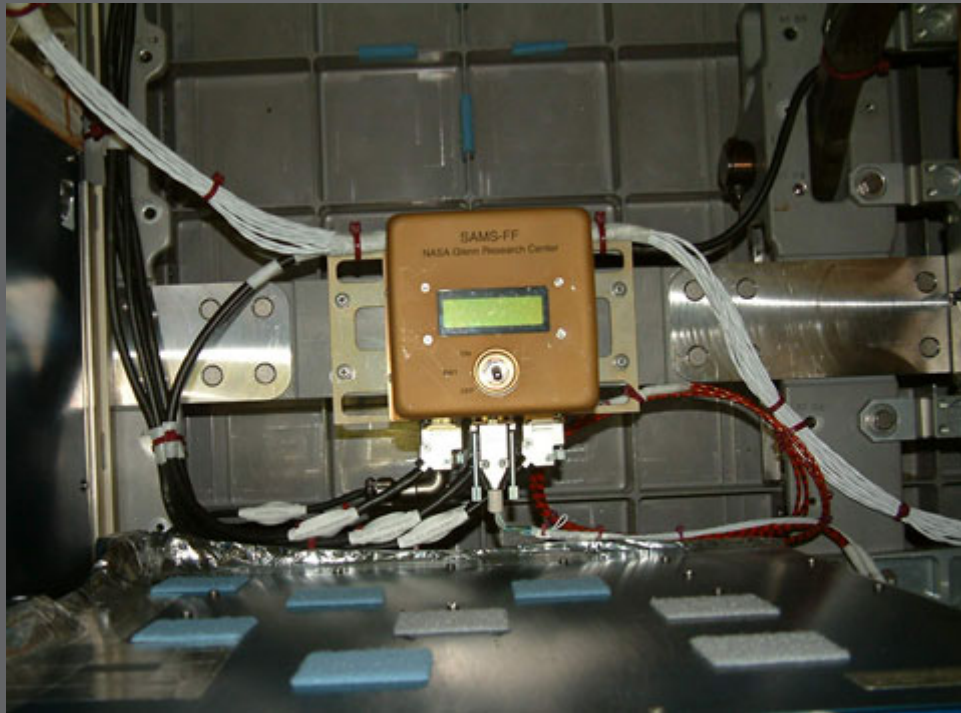
Dr. Robert Berg, the CVX-2 Principal Investigator, oversaw the experiment from the NASA Goddard Payload Operations Control Center.



The CVX-2 Project Team. The enlarged version of the CVX-2 experiment patch is being held by Dr. Robert Berg (left, the Principal Investigator) and Dr. Mike Moldover (right, the Co-Principal Investigator).



The SAMS-FF/PIMS team at work in the Payload Control Center at Johnson Space Center. From front to back, Greg Fedor, SAMS-FF/PIMS engineer; Ron Sicker, Project Manager; and Ken Hrovat, a PIMS engineer.

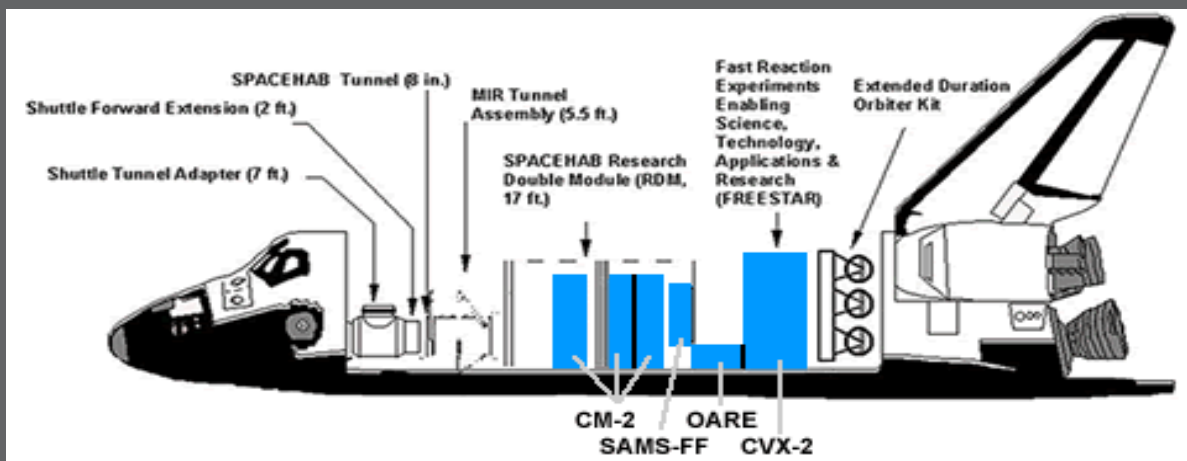


The SAMS-FF Control and Data Acquisition Unit in the SPACEHAB Module.



The SAMS-FF triaxial sensor head (center) and the triaxial fiber optic gyroscope roll-rate sensor (left and right) in place in the SPACEHAB Module.

Pre-Flight Images



This schematic of the Shuttle Columbia shows where the Glenn-originated, STS-107 experiments/hardware are located (in blue).



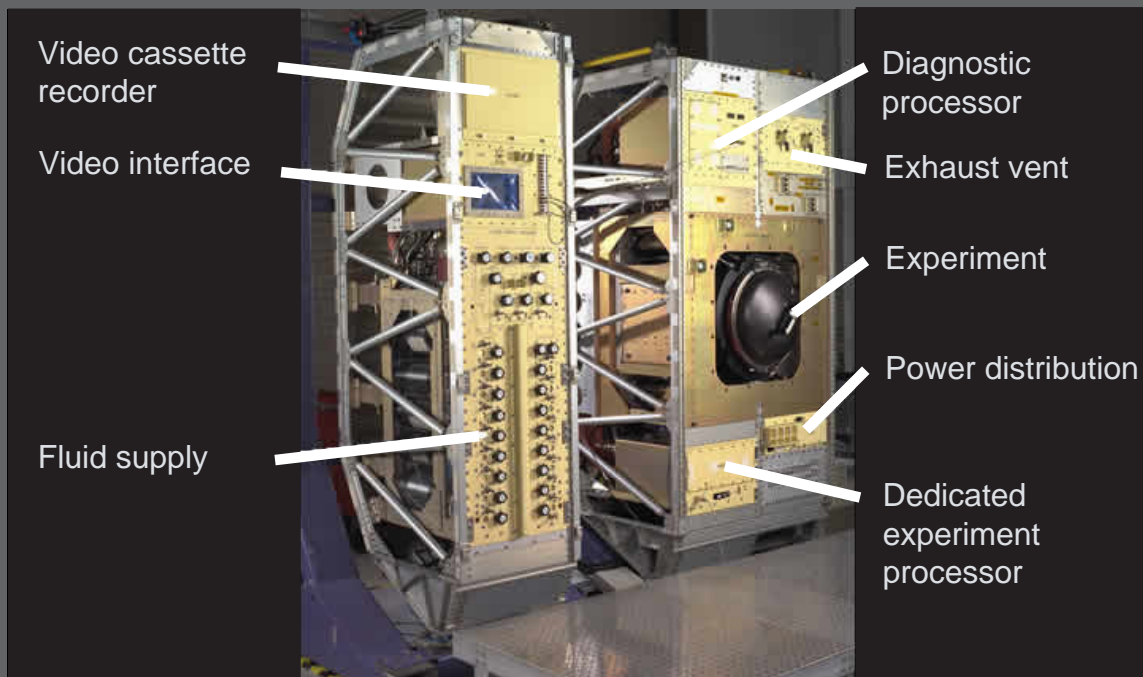
Final pre-flight testing of Combustion Module-2 in the SPACEHAB module.



The Combustion Module-2 Double Rack being installed in the SPACEHAB Module.



The Combustion Module-2 racks in place inside the SPACEHAB Module.



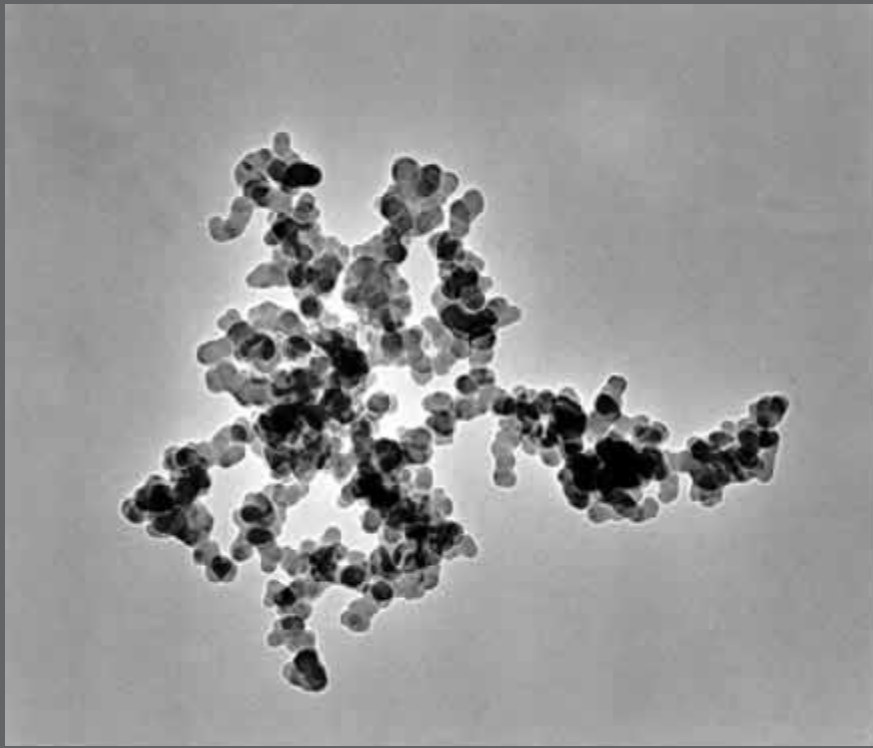
The CM-2 and its eight major components (packages).



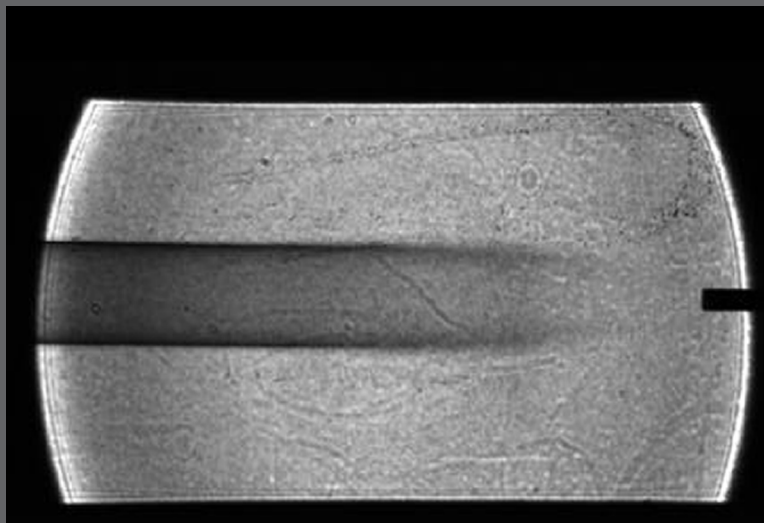
A systems engineer (Clarence Hawkins, left) and a software engineer (Laura Maynard-Nelson) inspect the Combustion Module-2.



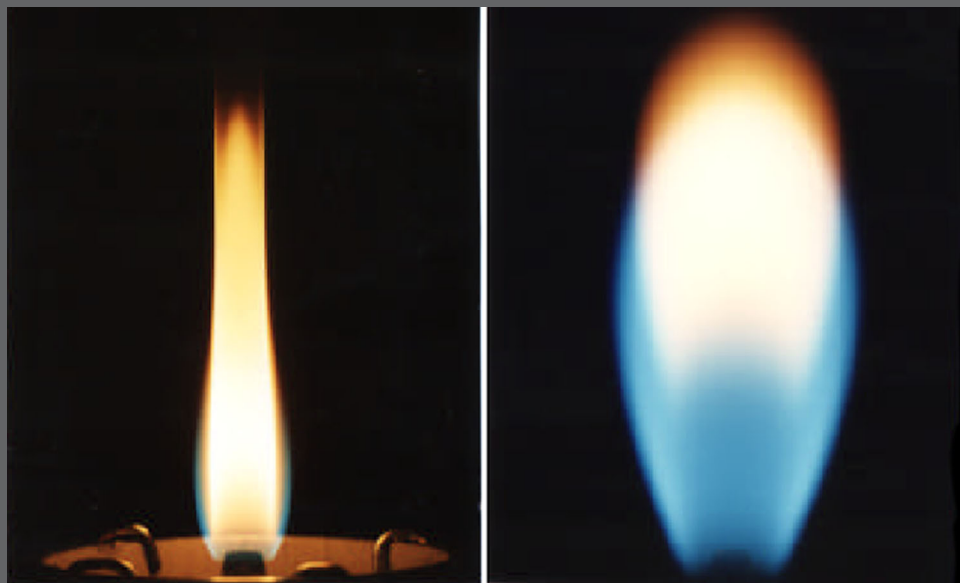
Astronaut Janice Voss servicing an EMS during the MSL-1 mission in 1997.



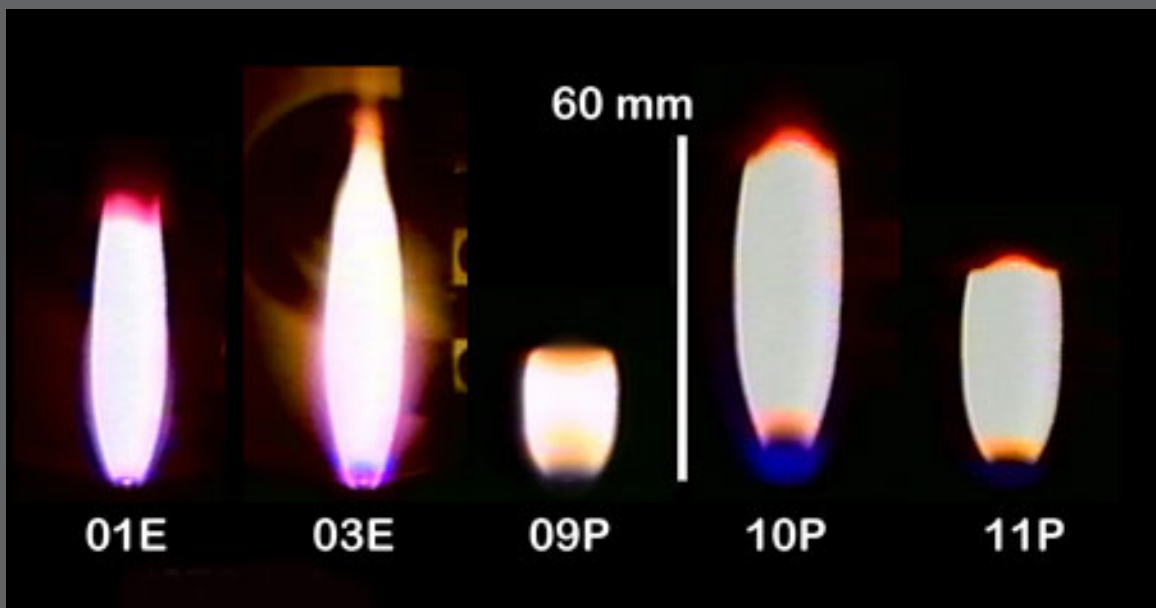
Individual soot particles measure 10-60 nanometers wide; aggregates are 1,000 nm (1 micron) wide. (Photo from 1997's MSL-1 mission.)



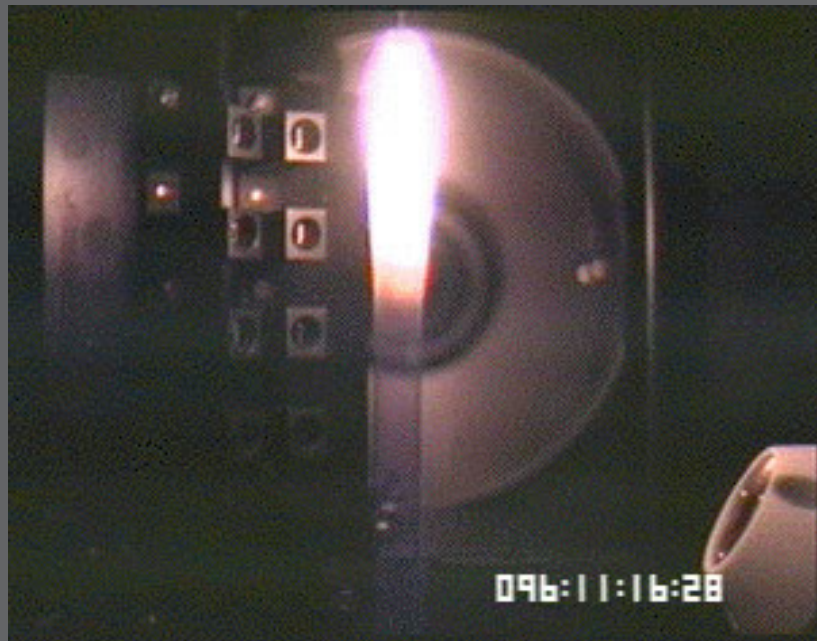
This laser image from a previous mission shows the soot produced by an LSP flame.



A laminar jet diffusion flame in normal gravity (left) and in microgravity (right).



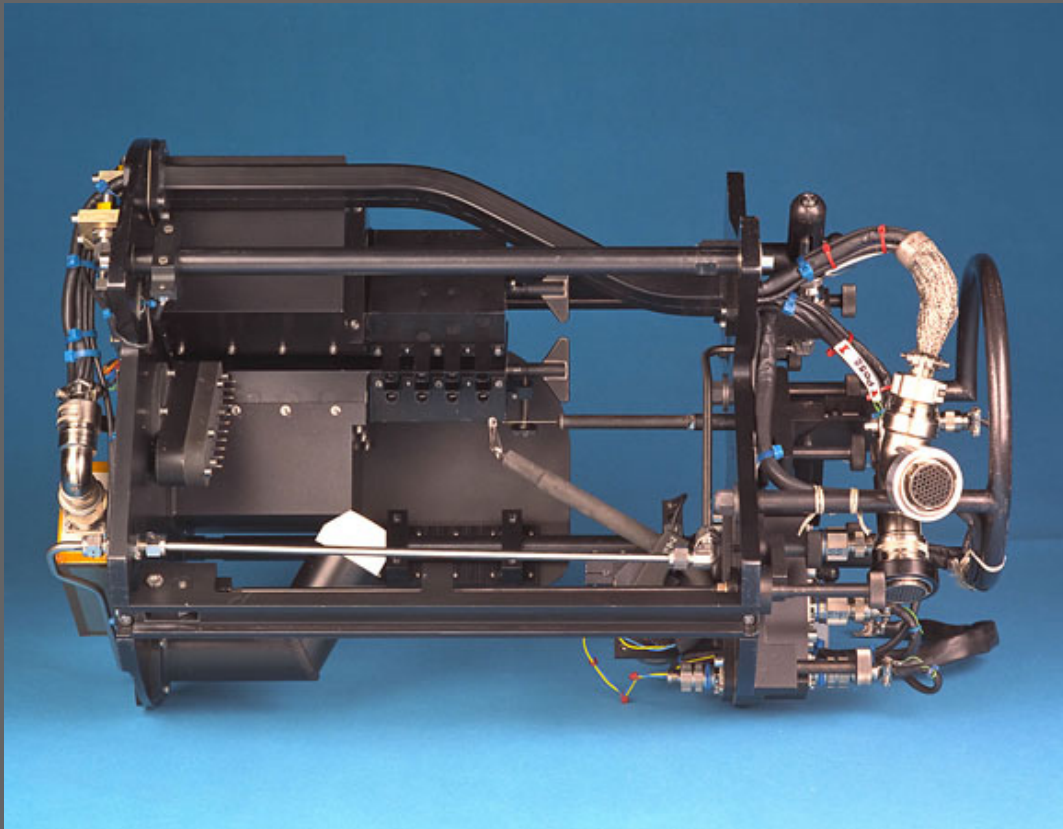
A collection of LSP flames from the STS-83 mission.



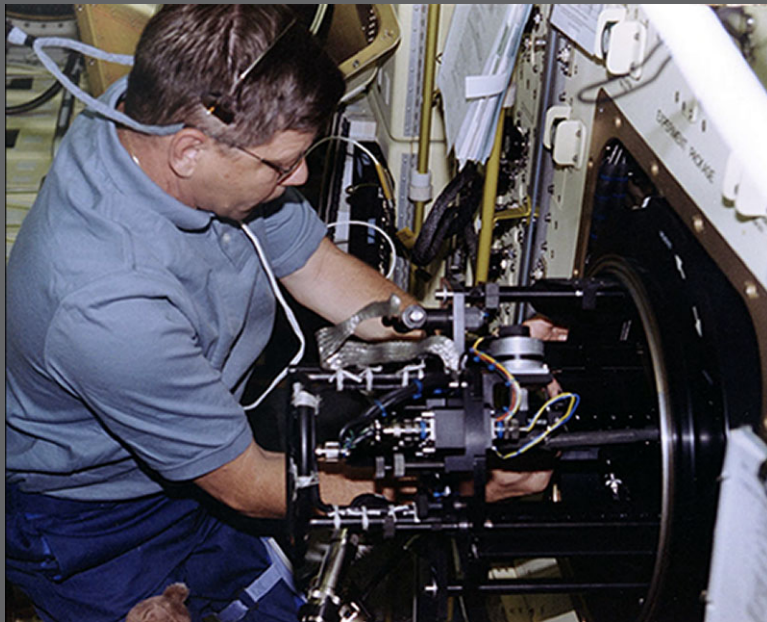
An LSP flame and the soot sampler bank during the STS-83 mission.



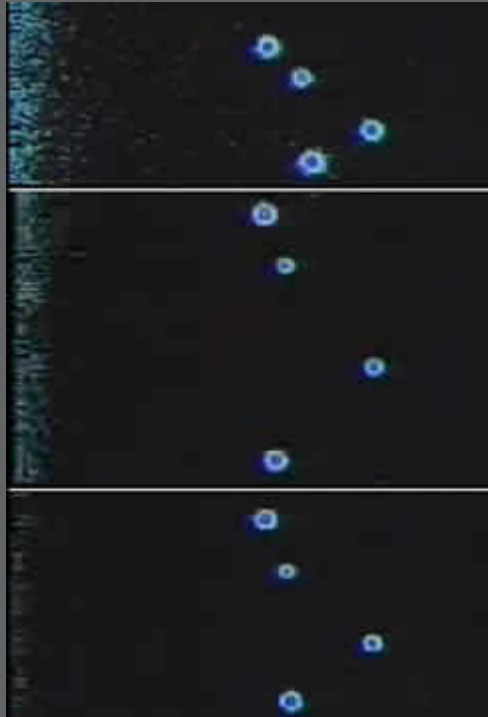
Dr. David Urban, the LSP-2 Project Scientist (bottom), assists astronauts Ilan Ramon (middle) and Kalpana Chawla (top) during a training session at NASA Glenn Research Center.



The LSP-2 Experiment Mounting Structure.



Astronaut Roger Crouch inserting the LSP-1 Experiment Mounting Structure into CM-1 during a mission in 1997.



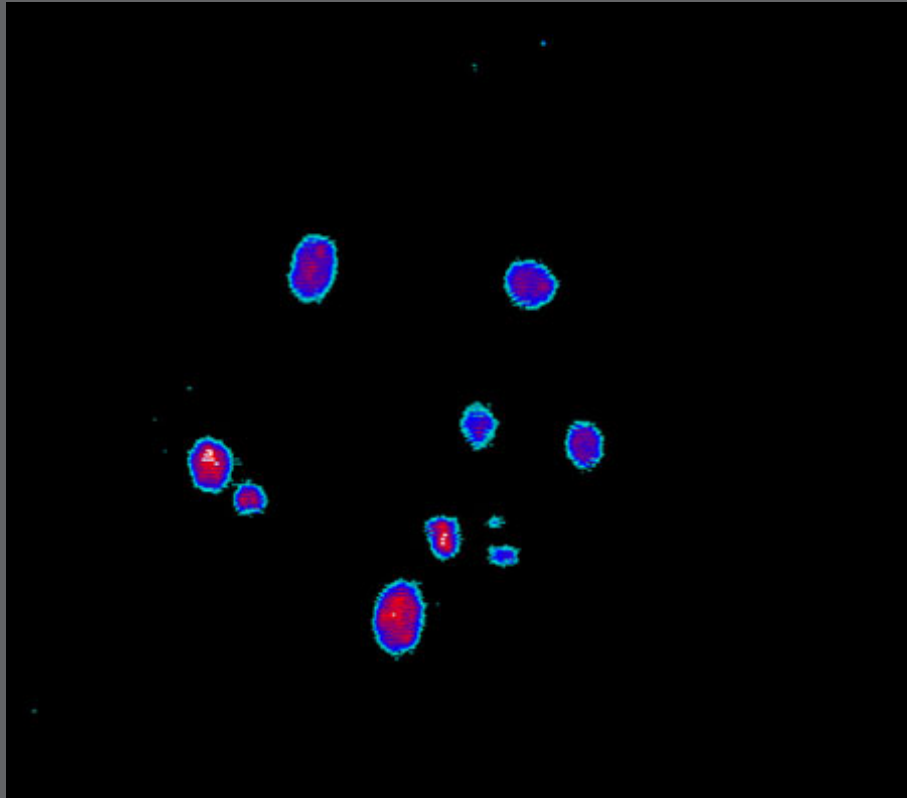
Flame balls recorded during a previous experiment by cameras with image intensifiers. In normal lighting, flame balls are invisible.



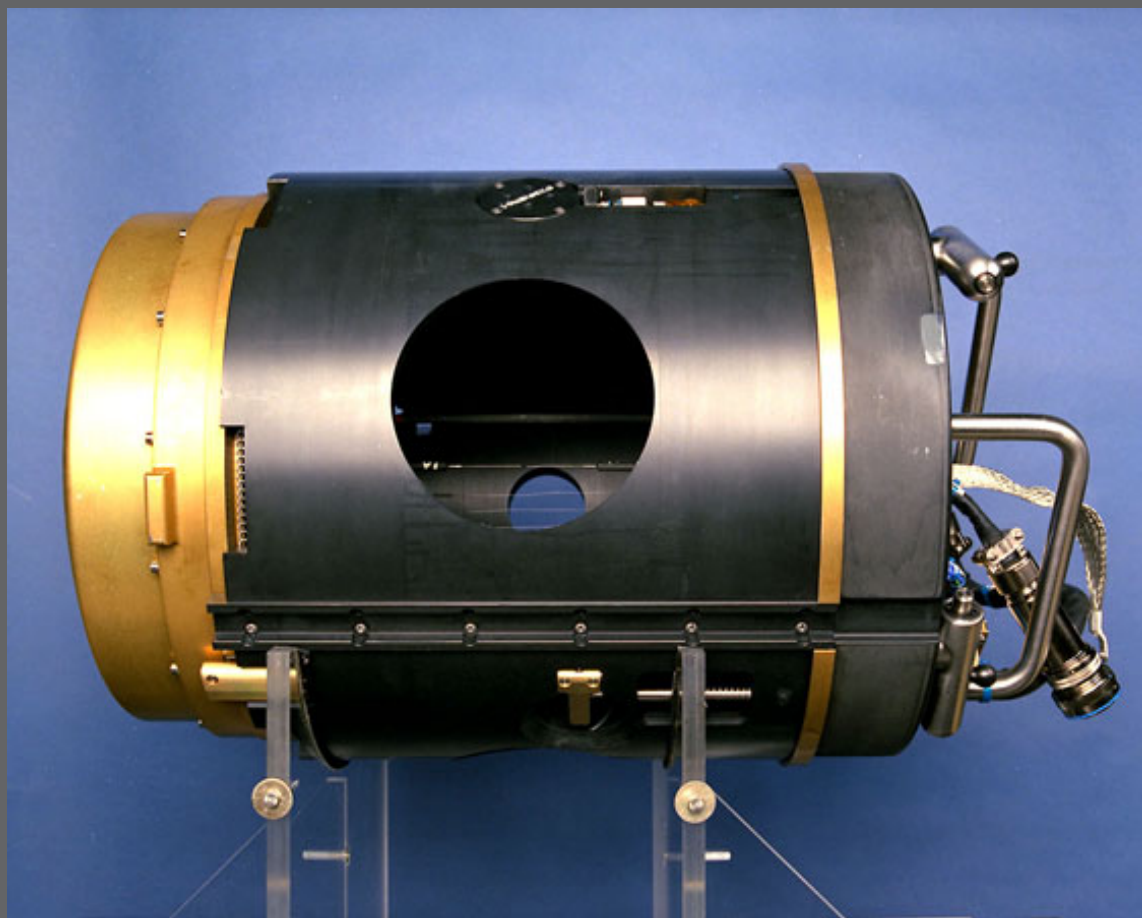
STS-107 crew members Ilan Ramon (left) and Michael Anderson practice inserting the SOFBALL-2 EMS into the Combustion Module-2.



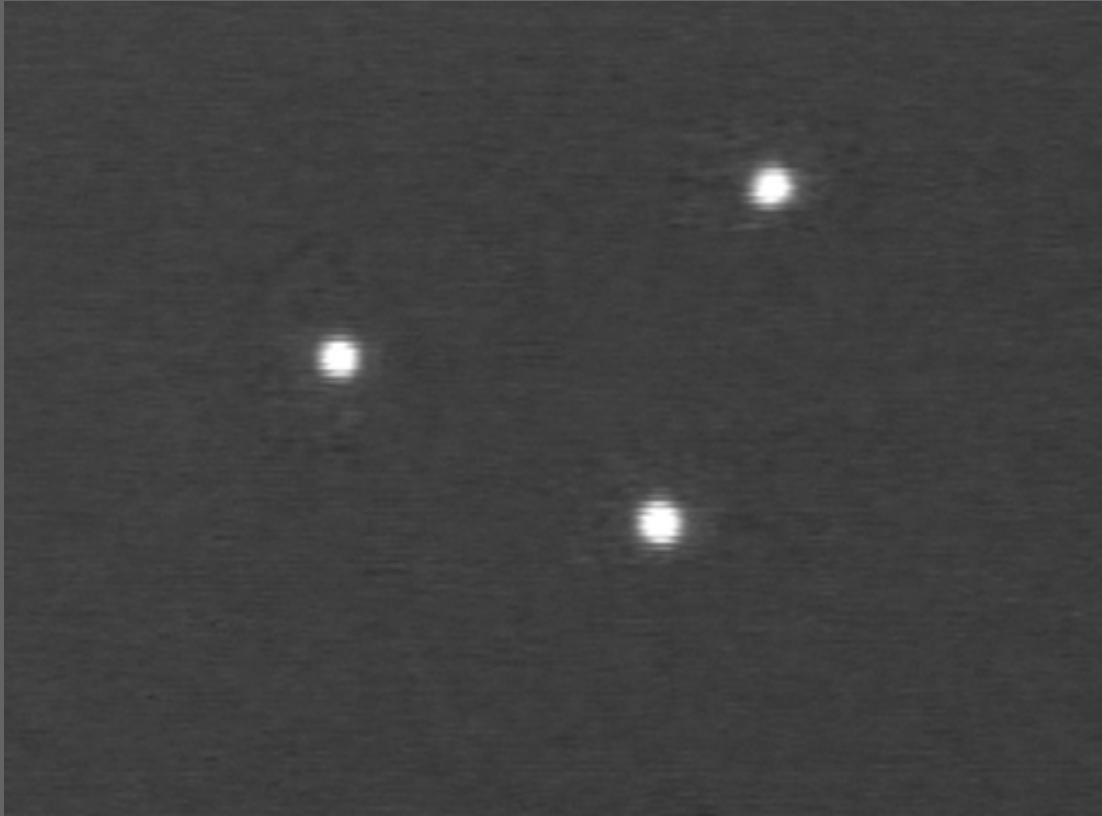
Astronaut Janice Voss pointing at SOFBALL flame balls during STS-94.



A color-enhanced image of SOFBALL flame balls.



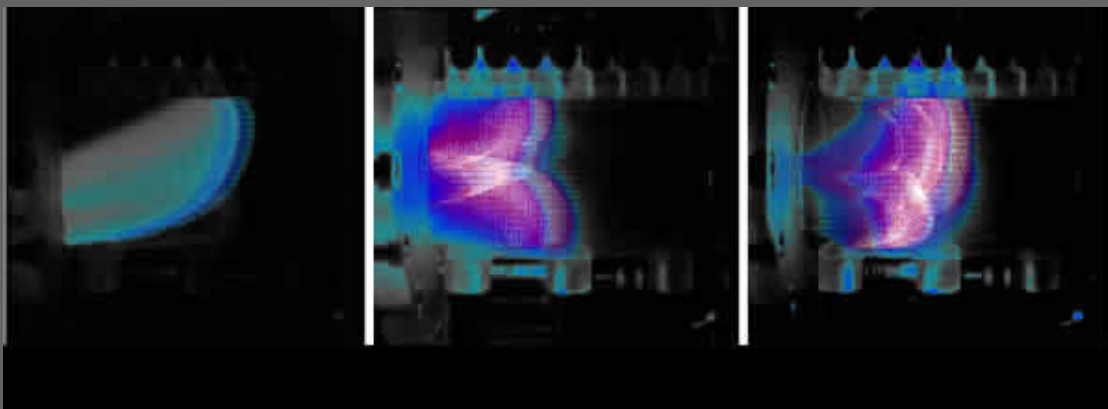
The SOFBALL-2 Experiment Mounting Structure.



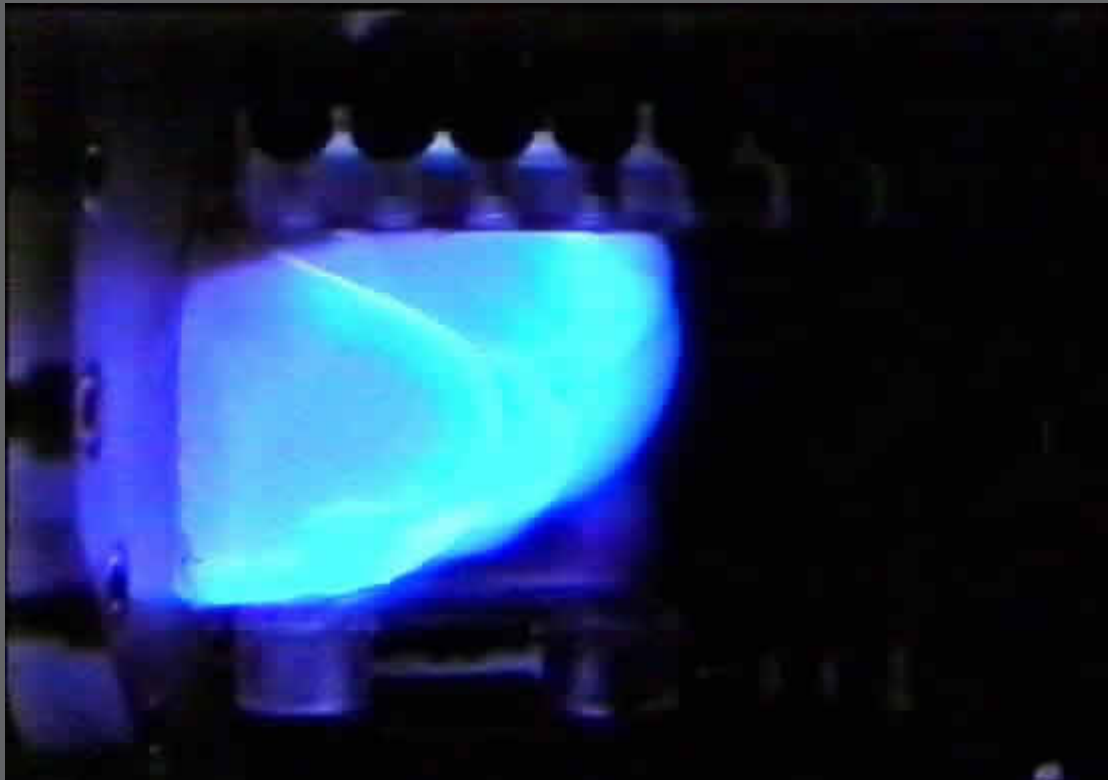
An intensified image of the first flames balls recorded in space during the SOFBALL experiment aboard STS-83.



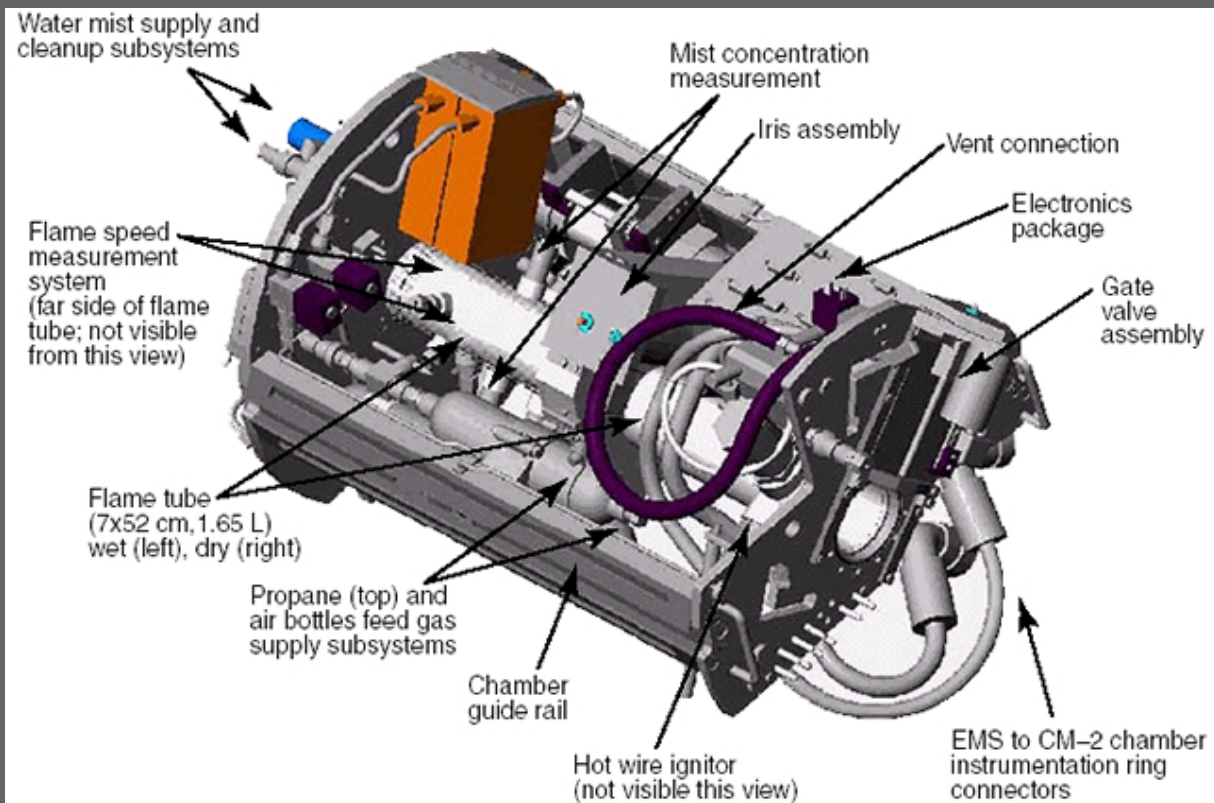
This panel of images shows a Mist flame entering the flame tube on the right, encountering water mist in the middle frame, and slowing down and breaking up in the far left frame.



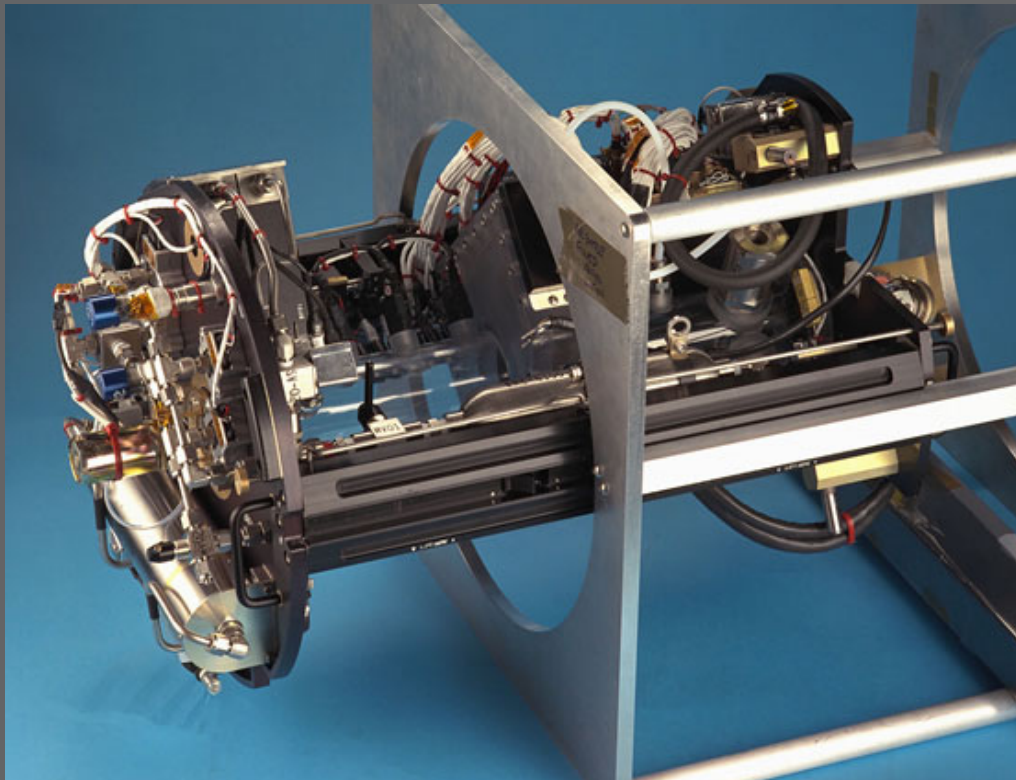
This sequence of color-enhanced Mist images shows how a uniform flame front (left) begins to break up as it enters the misted section of the experiment tube (center) and progressively deteriorates as it travels down the tube (right).



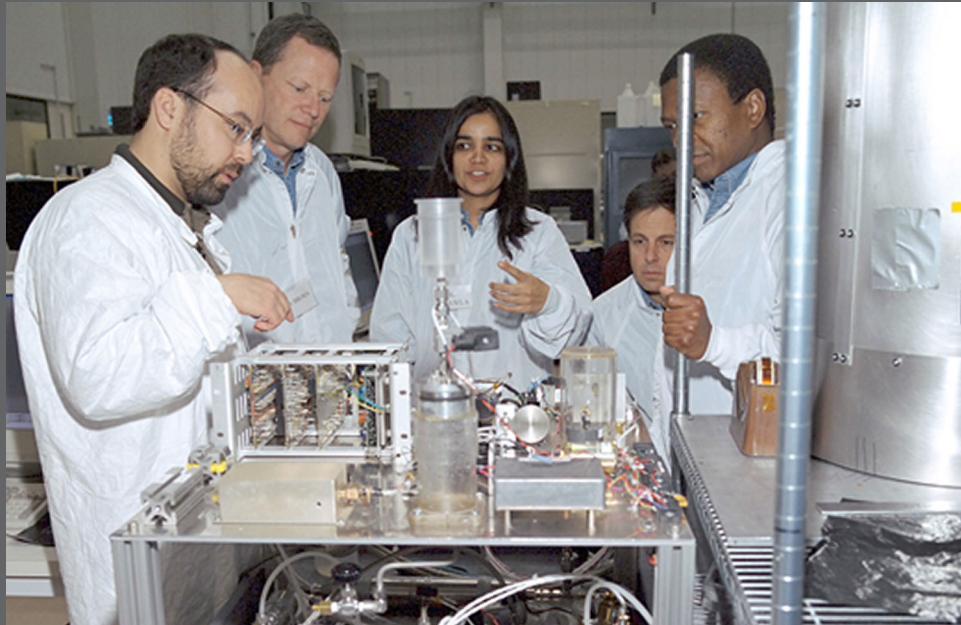
A robust Mist flame traveling, from left to right, through a flame tube during testing in normal gravity at NASA Glenn Research Center.



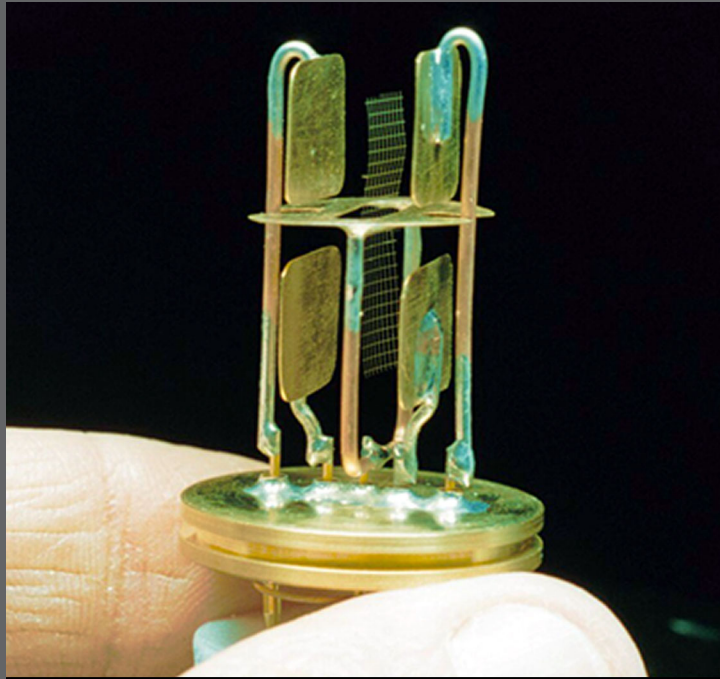
A 3-D schematic of the Mist Experiment Mounting Structure, with major components identified.



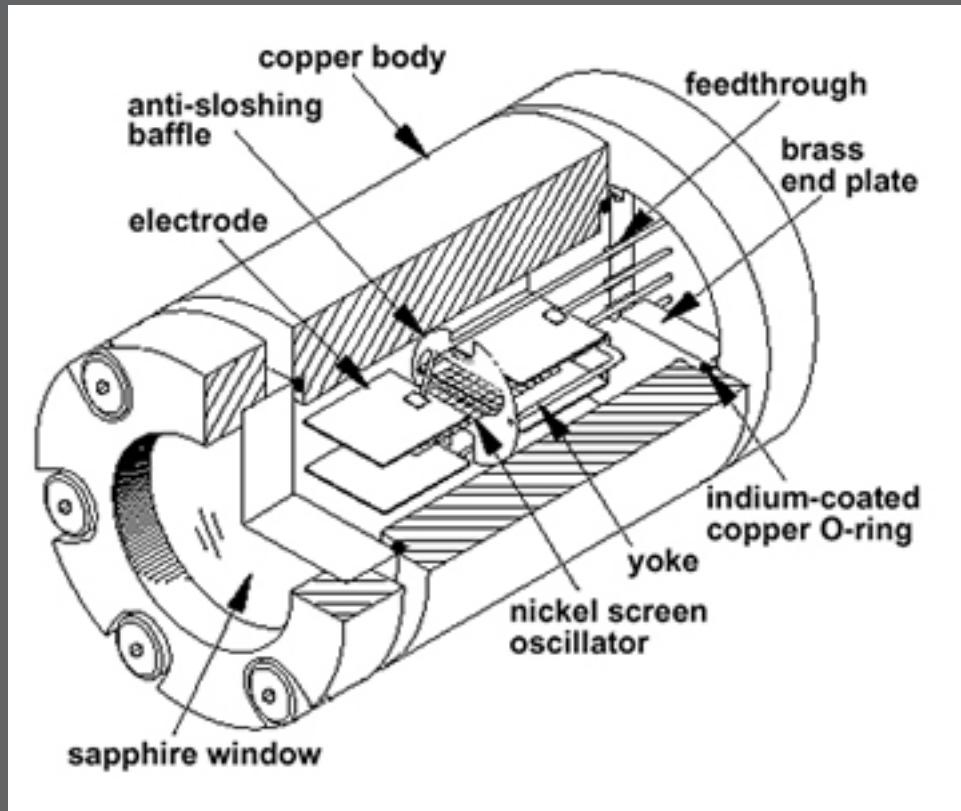
The Water Mist Experiment Mounting Structure in a ground-test stand.



Mist Co-Investigator Dr. Angel Abbud-Madrid (left) instructs STS-107 astronauts (from right) Michael Anderson, Ilan Ramon, Kalpana Chawla, and David Brown in the operation of the Mist experiment.



The oscillator at the heart of the CVX-2 experiment—which resembles a bit of window screen—vibrates between two pairs of paddle-shaped electrodes.



A cutaway of the CVX-2 cell, showing the paddle-shaped electrodes, the oscillator, and other major components.



A view of the Shuttle's payload bay during the STS-85 mission. The CVX hardware is contained in two grayish-blue canisters near the center of the payload bay.



The SAMS-FF triaxial sensor head is designed to measure the general vibratory environment of the Shuttle.



The SAMS-FF Control and Data Acquisition Unit (CDU) is a rugged computer designed to control the sensors from Earth via telemetry.



The SAMS-FF triaxial sensor head (center) measures acceleration in three directions. The triaxial fiber optic gyroscope roll-rate sensor (left and right) measures roll, pitch, and yaw.



STS-107 crew members during a SAMS-FF hardware training session conducted at NASA Glenn Research Center by project engineers Tom Kacpura (far right) and Gregory Fedor.